



EXPRESS MAIL NO. EV336651015US

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants : Reishi Naka et al.  
Application No. : 10/004,538  
Filed : October 23, 2001  
For : THERMAL CONDUCTIVITY MEASUREMENT METHOD AND  
INSTRUMENT AND METHOD OF PRODUCING A HEAT  
INSULATING MATERIAL

Examiner : Gail Kaplan Verbitsky  
Art Unit : 2859  
Docket No. : 980039.409  
Date : March 10, 2004

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

DECLARATION OF INVENTOR REGARDING "STEADY STATE"  
UNDER 37 C.F.R. § 1.132

Commissioner for Patents:

I, Masato HAYASHI, declare and state as follows:

1. I am a joint inventor of the above-identified patent application ("subject application").
2. I am employed as a senior engineer at Nisshinbo Industries Inc. of Tokyo, Japan ("Nisshinbo"). Since my graduation from Nagoya Institute of Technology where I obtained BS degree in chemistry, and have been so employed for about 18 years. Including my employment with Nisshinbo, I have practiced as an engineer for 18 years, 17 years of which involved significant research, development and testing of insulating materials and products made with insulating materials. Through my experience, I have become well aware of the standards and terminology used in the insulating materials industry and have filed 9 domestic patent applications in the same field of art since year of 2000. Some of them have been filed with the United States Patent and Trademark Office.

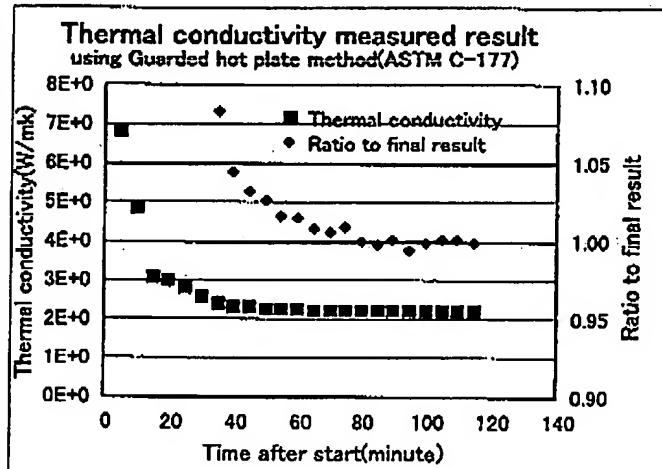
3. I have read and understand the subject application and the comments of the Examiner contained in the Office Action mailed December 4, 2003. In that Office Action, the Examiner asserts that the subject application did not describe the invention in such a way as to reasonably convey to one skilled in the art of insulating materials that the inventive method measures the temperature in the heat resistant material before the temperature has reached steady state, or to enable one of skill in the art to make and/or use such an invention. Further, the Examiner asserts that the term "steady state" was not clearly described in the specification of the subject application.

4. Regarding the definition of "steady state," an individual of ordinary skill in a field associated with heat transfer knows exactly what is meant by the term "steady state," as an understanding of steady state is a critical requirement for succeeding in such a field. In general, "steady state" means the point in time when the thermal conductivity stops changing over time, or at least where the change over time becomes negligible. In other words, when heat is initially applied to a piece of material, the thermal conductivity is at a maximum because the difference in temperature between the material and the heat source is at its greatest; but as the temperature of the materials approaches the temperature of the heat source, the amount of thermal conductivity reduces and the change in thermal conductivity over time decreases, until the change becomes negligible. That final point in time defines is when the system has reached steady state. A more practical definition of "steady state" is provided in ANSI/ASTM C 177, which is one standard used by those of ordinary skill in the art of heat transfer: "...until four successive sets of observations give thermal resistance values differing by not more than 1%."

5. In reviewing the specification for the subject invention, it is clear to me, as one of ordinary skill in the art, that the claimed invention is sufficiently detailed to not only describe a method that is performed before the temperature reaches steady state, but also to distinguish the invention over systems that measure the temperature after the system has reached steady state. First, for example, in describing the prior art, the specification indicates, "...as the plate comparison method takes about 1 hour to measure heat conductivity, it is difficult to measure a large number of products" (p. 1, lines 17-18). An individual of ordinary skill in the art of insulating materials, having reviewed this specification, will immediately appreciate that a system takes an hour to measure heat conductivity because the system measures the steady state temperature. As indicated in the following tables, which are from our experiment, insulating

materials reach steady state in about an hour. Accordingly, one of ordinary skill in the art will immediately appreciate that "about an hour" puts the system into the steady state. Thus, the prior art systems measured thermal conductivity at steady state.

| Mminutes | thermal conductivity<br>W/mk | Ratio to final |
|----------|------------------------------|----------------|
| 5        | 0.006819                     | 3.035          |
| 10       | 0.004872                     | 2.168          |
| 15       | 0.003132                     | 1.394          |
| 20       | 0.003041                     | 1.353          |
| 25       | 0.002849                     | 1.268          |
| 30       | 0.002612                     | 1.162          |
| 35       | 0.002434                     | 1.083          |
| 40       | 0.002347                     | 1.045          |
| 45       | 0.002321                     | 1.033          |
| 50       | 0.002308                     | 1.026          |
| 55       | 0.002283                     | 1.016          |
| 60       | 0.002281                     | 1.015          |
| 65       | 0.002287                     | 1.009          |
| 70       | 0.00226                      | 1.006          |
| 75       | 0.002269                     | 1.010          |
| 80       | 0.002248                     | 1.000          |
| 85       | 0.002244                     | 0.999          |
| 90       | 0.002251                     | 1.002          |
| 95       | 0.002235                     | 0.995          |
| 100      | 0.002248                     | 1.000          |
| 105      | 0.002251                     | 1.002          |
| 110      | 0.002252                     | 1.002          |
| 115      | 0.002247                     | 1.000          |



6. Second, the description of the embodiments of the invention repeatedly make it clear that the inventive method measures thermal conductivity after a short amount of time, which an individual of ordinary skill in the art will immediately appreciate is a time before the system reaches steady state. For example, on page 1 at line 22 the application states, "...the present invention measures heat conductivity in a short period of time"; on page 8 at line 8 the application states, "[t]he personal computer 81 counts the measuring time and terminates measurement after a predetermined duration, such as 120 seconds..."; on page 10 at line 10 the application states, "...possible to measure the heat conductivity in a short period of time"; and on page 10 at line 15 the application states, "...can be measured accurately in a short period." Each of these references clearly convey to an individual of ordinary skill in the art that the inventive method measures thermal conductivity before the system has reached steady state.

7. In summary, although the specification in the subject application does not use the specific term "steady state," it is clear to one of ordinary skill in the art, having read the entire specification, that the invention operates before the system has reached steady state, and that the inventor appreciated that the prior art, on the contrary, operated after the system had reached steady state.

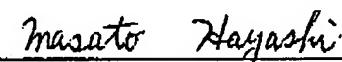
8. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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March 19, 2004

Date

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Name: Masato HAYASHI